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## CALCULUS.

95. Proposed by G. B. M. ZERR, A. M., Ph. D., Professor of Mathematics and Science, Chester High School, Chester, Pa.

A ship starts at the equator and sails northeast at all times. How far has the ship sailed (in miles) when her latitude is  $30^\circ$ ,  $45^\circ$ ,  $60^\circ$ ,  $90^\circ$ ? How far when her longitude is  $90^\circ$ ,  $180^\circ$ ,  $270^\circ$ ,  $360^\circ$ ? Regarding the earth as a sphere, radius 3956 miles.

96. Proposed by W. H. CARTER, Vice President and Professor of Mathematics, Centenary College, Jackson, La.

If  $f(x) = \int f(x)dx$ , find  $f(x)$ , the constant being zero.

\*\*\* Solutions of these problems should be sent to J. M. Colaw not later than Sept. 10.

## MECHANICS.

93. Proposed by WALTER H. DRANE, Graduate Student, Harvard University.

A small rope, which is passed over a smooth pulley, has attached at one end a weight of twenty pounds and at the other end hangs a monkey, also weighing twenty pounds. Is it possible for the monkey to climb to the pulley, and if so, what will happen to the weight?

94. Proposed by G. B. M. ZERR, A. M., Ph. D., Professor of Mathematics and Science, Chester High School, Chester, Pa.

In a parallelogram  $ABCD$ ,  $\angle D = \beta$ ,  $AB = a$ ,  $BC = b$ , the principal moments of inertia at the centroid are  $(\frac{1}{4}m)[a^2 + b^2 \pm \sqrt{(a^4 + b^4 + 2a^2b^2\cos 2\beta)}]$  and the principal axes at the same point make with the side  $CD$  an angle  $\theta$  given by

$$\tan 2\theta = \frac{b^2 \sin 2\beta}{a^2 + b^2 \cos 2\beta}.$$

95. Proposed by FLORIAN CAJORI, Ph. D., Author of History of Mathematics, History of Physics, etc., and Professor of Mathematics, Colorado College, Colorado Springs, Colorado.

Assuming that the velocity is proportional to the distance described from the state of rest, (1) can the body start in motion? (2) If it can, what is its initial acceleration? If we make the additional assumption that the time of fall, from rest, through a finite distance is finite, does it follow that the velocity is infinite?

96. Proposed by GEORGE R. DEAN, Professor of Mathematics, University of Missouri School of Mines and Metallurgy, Rolla, Mo.

Two particles, subject to their mutual attraction and that of a fixed center, move in a plane containing the center. Find the motion under the law of the inverse square.

\*\*\* Solutions of these problems should be sent to B. F. Finkel not later than Sept. 10.

## DIOPHANTINE ANALYSIS.

81. Proposed by A. H. BELL, Hillsboro, Ill.

Given  $2x^2 - 47y^2 = -29$ . To find four integral values for  $x$  and  $y$ .

82. Proposed by J. H. DRUMMOND, LL. D., Portland, Me.

In the series  $1^3 + 3^3 + 5^3 + \dots$  find  $n$  so that the  $n$ th term and the sum of  $n$  terms shall both be squares.

\*\*\* Solutions of these problems should be sent to J. M. Colaw not later than Sept. 10.